



With a \$50,000 planning grant from the National Endowment for the Humanities' Sustaining Cultural Heritage Collections program, The Rosenbach set out to ensure the long-term environmental and financial sustainability of its collections and building. The purpose of this project was to conduct a thorough analysis of the environmental challenges—including the HVAC system, pest infestation, water infiltration, and lighting—affecting The Rosenbach's 19th-century townhouse and its adjacent building, and to recommend solutions to protect its holdings of 30,000 rare books, 300,000 manuscripts, and more than 20,000 decorative and fine arts objects. These issues are common in many historic house museums and institutions with valuable collections acutely sensitive to environmental fluctuations. Rosenbach staff worked with various contractors and consultants to analyze current conditions and identify smaller-scale solutions that were ready for implementation within the scope of the grant. We also worked to better understand the larger scope and costs that would be associated with resolving the issues we identified as part of the project, in order to create a more sustainable, cost-effective, easily-managed, and protective environment for our collections.

The Rosenbach is, at once, the period house once lived in by our founders, a museum with exhibitions, a special collections research library, and a community-focused institution offering public programs. Our collections play significant roles in each of these functions; they are the furnishings and decor of the house that our visitors tour daily, the objects on display in our four exhibition galleries, the nearly 400,000 objects our researchers can explore during their appointments in our reading room, and the inspiration for the nearly 100 lectures, courses, live interviews, musical events, and "Hands-On Tours" we offer annually.

Our collections, which include some of the best-known literary and historical objects in the world, are at the core of our work and of our visitors' interests. As such, we are obligated to care for them in ways that will protect them for future generations. The Rosenbach's collections include various types of media, with the majority being written works, including books and manuscripts. Although most of these collections are focused between the 15th and 20th centuries and have origins concentrated in Britain and the Americas, the total collection spans approximately 4,000 years and touches on cultures around the globe. We make every effort to educate about the past while also connecting our collections to ideas that are relevant in the modern world.

The historic period house, where our founders lived until the mid-20th century, holds most of The Rosenbach's collections of furniture, carpets, silver, lighting fixtures, glass, textiles, fine art, and books. The period house is exposed to natural light from both the north and south, through windows currently covered by UV-protected interior storm windows that mitigate some light penetration and airflow. There are also artificial lights throughout our spaces, which are controlled by volunteer guides as they take the public through on tours. The period house also

contains three of our four changing exhibition galleries, which are self-guided experiences. These three galleries have automated lighting that remains on only when the space is occupied, but one has a dated system that does not allow for the lights to be dim enough to appropriately protect collections. The fourth exhibition gallery in our adjacent building has similarly dated lighting, and that gallery is not automated, so the lights tend to be left on for periods of time, resulting in excessive light exposure for the objects on view.

All of our collections are stored on site in four separate storage areas, three of which are protected by specialized HVAC units. The fourth contains collections that do not require specialized temperature or humidity controls. All of the areas where our collections are stored or displayed are subject to the effects of our aging HVAC systems. The climate within The Rosenbach is also affected by the exterior deterioration to both brick buildings. Moisture and air flow through gaps in the building envelope can affect interior temperature and humidity levels, as well as permit—or even encourage—pest infiltration. Additionally, ductwork inside the walls has broken down over time, causing localized condensation, and in turn, peeling and cracking paint on some walls, and increasing risk to sensitive objects housed within affected rooms. }

With support from the National Endowment for the Humanities (NEH), The Rosenbach undertook this project to investigate how we could address these environmental issues to better protect our incredibly important collections and preserve them for the future. We wanted the methods we chose to address these issues to be broadly sustainable: financially manageable, energy efficient, environmentally appropriate, and labor saving. Above all, they needed to make a positive impact on our ability to preserve our collections for the benefit of future generations.

After an initial meeting with all of our consultants and contractors to kick off the project, Rosenbach staff met individually with the specialists in each of the areas in this study to conduct thorough investigations into their current conditions, and to discuss the effects of existing conditions on the collections. We also discussed potential improvements from the perspective of sustainability, stressing the overall importance of preserving our collections and making them more accessible to the public. Reports were shared among the consultants and contractors so they could include others' observations to inform their own work, and with our overall conservation consultant, Lois Price, who advised us on further correlations between the areas of study and questions on which we might follow up.

Below are the activities, objectives, results/outcomes, and other achievements for each area:

HVAC

1. Activities: With our primary contractor, Limbach, and subcontractors (Rochester Institute of Technology's Image Permanence Institute, Advanced Air, Carrier, and Tri State HVAC), we surveyed the mechanical systems that serve the period house and our newer, adjacent building (where all storage areas for our collections and one gallery are located) and assessed the age and condition of all existing equipment. We attempted to confirm the various ductwork locations, including supply and return air flow, which included the thermo-imaging of interior wall spaces. We set up monitoring systems over the length of the project to better understand the current capability of our systems to control temperature and humidity.

2. Objectives: We wanted to emerge from this review with a set of actionable items for implementation that would correct the issues we found. Primarily, we wanted to identify areas in which minimal investment could result in immediate improvements toward our ability to protect the collections. Secondly, we wanted to identify problems and projects that required more significant study, planning, and investment in the future.
3. Results/Outcomes: We found that the problems with our HVAC are so widely systemic that there were no minor investments possible, beyond purchasing more sophisticated monitoring equipment to help us better understand our situation and create an implementation plan for the future. There is significant leakage of supply and return air within the walls in many areas of the period house, possibly contributing to the peeling and cracking paint found throughout the building. There is almost no return HVAC, which seems to have been designed to return via a single return duct to the main unit in the basement. There appears to be the possibility of humidity passing through the wall of an adjacent neighbor's house, causing further peeling paint issues. The ability to maintain temperature and humidity levels has degraded significantly over the last several years.
4. Other Achievements: The discovery of these issues during the project required us to further survey and map out the period house ductwork before being able to devise truly cohesive next steps for an implementation plan. This led us to purchase additional data loggers and a subscription to eClimateNotebook with some of the current implementation funds for this project. With these products, we will be able to track data in real time and receive commentary on our standing on the preservation index. The preservation index helps us to understand the actual risk to our collections outside of the traditional standards for temperature and humidity settings, particularly those to which our lenders ask us to adhere. This information will give us a better understanding of the realistic standards we need to meet as we look toward major HVAC improvements to correct the failures observed as part of this project. At this time, we are redefining our standards for temperature and humidity control, with the goal of keeping levels more consistent over time rather than trying to maintain an impossible 70 degrees and 55% relative humidity (RH), give our current systems' inability to uphold that ideal. We are currently working with Limbach to begin our HVAC tracking activities and create the most appropriate and manageable plan for system upgrades.

Building Envelope

1. Activities: We worked with our consultant, Materials Conservation Company, to complete a visual inspection of the interior and exterior of the period house, as well as of the connecting sections of our adjacent building.
2. Objectives: We identified the areas in need of repair and furthered our understanding of how the envelope contributes to the overall maintenance of interior temperature and humidity levels.

3. Results/Outcomes: We found that the façade requires more than the brick repointing and roof and rainwater conduction systems repairs and upgrades that we anticipated. It will also require an externally applied semi-permeable vapor barrier to help control interior humidity levels, and several windows will need to be repaired or replaced. Materials Conservation Company also provided us with advice on the proper procedure for back-filling the back basement wall during our upcoming garden renovation, to seal this area off from the possibility of pest and moisture infiltration.
4. Other Achievements: We identified a limited area that could be remediated within the scope of the current grant's implementation funding. We repaired the exterior joint flashing between the period house and the adjacent building, through which moisture had spread into all floors of the period house, causing mold issues. This has corrected significant moisture issues at the rear of the house and prevented a possible insect infiltration.

Pest Control

1. Activities: Working with our consultant, Pest Control Services, we completed a flashlight inspection of all areas of our building.
2. Objectives: Our goal was to devise a strategy to protect The Rosenbach from pest infiltration while also addressing other, related environmental concerns.
3. Results/Outcomes: In some areas of the buildings, the ability for insects to migrate into the building appeared to be well addressed, but in others, not at all. Recommendations were made for "common passive pest control," such as door sweepers and the sealing off of some outdoor-adjacent interior spaces. One such area—the rear basement—is scheduled to be back-filled in conjunction with a future upgrade to the garden behind The Rosenbach. The sealing of the back wall prior to back-filling will be helpful in keeping the current influx of pests out. Likewise, some of the work that is required within the scope of the building envelope work recommended by Materials Conservation Company—including repairs to windows, repointing of brick, and mitigation of moisture issues—will also be helpful in limiting the attraction of pests to the building.
4. Other Achievements: Shortly after securing this grant, The Rosenbach experienced a massive moth infestation, which drastically shifted the original focus of our pest control efforts. During our inspection, we located remnants of abandoned horse hair insulation in the ceiling cavity on the third floor, as well as tufts in the basement. This material serves as both food and nesting material for webbing clothes moths, and we had noticed them swarming around the area where the horse hair insulation was discovered. Without a complete removal of the ceilings and walls to clean out the remaining insulation, there is no way to eradicate the moth population. We can, however, adhere to a rigorous cleaning and inspection regimen. We have learned more about the moths' behavior and have taken steps to give them as little ability as possible to nest and feed in and around our collections. We have tracked the population in our period spaces over time, beginning at

the height of our infestation, and we have managed to keep the population at a minimum through our diligence.

Lighting

1. Activities: In working with our contractor, EwingCole, The Rosenbach team reviewed the period house's rooms and all galleries in which collections are displayed to measure the existing natural and artificial lighting conditions. All light exposure can lead to deterioration of a collection's objects over time.
2. Objectives: Our goals were to minimize UV exposure and high levels of natural light within the house, provide new lighting sources with no UV components and reduced energy consumption to enhance visitors' visual experience, utilize automatic lighting controls so lights will only turn on when spaces are occupied to minimize light exposure to collections, and upgrade lighting and control systems in traditional gallery spaces to minimize heat and UV exposure, and simplify maintenance.
3. Results/Outcomes: EwingCole's took measurements of daylight infiltration for all period house spaces. Given the differences between the building's northern and southern exposure, we decided to address each area of the building with different solutions. We agreed, however, that our currently existing UV-protective interior storm windows (installed in 2003) require either the addition of a new film layer to further block a broader spectrum of light, or the replacement of the current glass with new grey glass panels. This selection would be based on the cost and longevity of the materials. We also discussed finding appropriate drapes or shades that would minimize daylight exposure but would still make the spaces inviting to visitors. We identified several possibilities: replacing all current halogen lighting with LED bulbs; redesigning one of our second-floor galleries with a new track for LED heads (our other two galleries have recently been upgraded), and doing the same for our first-floor gallery; replacing downlights in our east and west libraries with LED lights; adding LED cove lighting over selected bookcases to enhance the overall lighting during dark days and evening hours; and affixing LED cove lighting in the Marianne Moore room for the same purpose. To enable our lighting systems to be switched off when not in use, we discussed adding occupancy sensors to all rooms and circulation areas in the period house and adding similar, dimming-based systems in the renovated galleries. In reviewing our recommendations, we took into consideration the building's status as a historical landmark, and noted that any exterior changes—such as the replacement of windows—would need to address its appearance reflectivity from the outside. We may also require advance approvals by the appropriate agencies, such as the Philadelphia Historical Commission. Further, we considered the impact of any changes on staff—both professional and volunteer—and whether such changes would make their daily routines more or less cumbersome. We note that, currently, our volunteer tour guides must turn lights on and off as they move through the period house; however, we do not always succeed in getting all of our volunteers to dim the lights when they leave a space, so the objects are often subjected to more exposure over time than is necessary.

4. Other Achievements: With funding from this grant, we were able to replace all candelabra lightbulbs in fixtures throughout the period house with new LED bulbs. We tested several lamps to find the one closest in look and color temperature to the incandescent bulbs we had been using. We also installed LED lamps along contemporary track fixtures in the period house stairwell and the fixtures in the recreated living room of poet Marianne Moore. In this room, we also added some LED up-lighting—which is unseen from the visitor’s point of view—to enhance the light emitted by one of the poet’s lamps and, thereby, add to the ambient light in the room. The overall effects of this change are overall energy savings (our previous wattage per lamp was 40 and is now 4), decreased staff effort (we used to spend staff time changing lightbulbs, but since these LEDs have significantly longer lifetimes, we shouldn’t have to change a bulb for 10 years or more), limited damage to collections (LEDs do not subject objects to UV damage), and limiting heat (because bulbs do not emit heat, we may see less need for cooling measures throughout the summer). Although we still have other aspects of our lighting objectives to resolve—particularly in relighting our galleries and libraries, reconfiguring the controls for the lighting in the period house, and controlling the daylight infiltration into the period spaces—simply changing many of our fixtures to LED lighting has made a significant stride in protecting our collections.

Overall, we learned a great deal about the current condition of our buildings, the efficacy of the systems we had in place, and potential solutions. Through this process, we implemented several small yet significant changes, improving several areas of concern, and paving the way for larger, more sustainable changes in the future. Our contractors and consultants generated reports that offer us guidelines for pursuing larger renovation and remediation projects, including viable solutions for our lighting, building envelope, and pest issues. We are also now tracking our HVAC systems more closely, so that we can develop an appropriate plan to address our inadequate systems after more thorough analysis.

The Rosenbach is grateful to NEH for allowing the opportunity to study our systems and reach this point in our understanding. We have made great progress in identifying the issues we must address to ensure the long-term viability of The Rosenbach to provide the public with access to its valuable collections, and we look forward to creating a healthier environment for the benefit of our visitors. It is our hope to apply for another NEH Sustaining Cultural Heritage Collections, Preservation and Access grant to implement many of the large-scale changes recommended by our contractors and consultants. At that time, we would share with the public acknowledgement of NEH’s generous support and our findings from this internally-focused planning grant. We expect that, if we can implement the changes recommended by our HVAC, lighting, building envelope, and pest control experts, The Rosenbach will continue to serve its nearly 15,000 annual visitors and the broader public for generations to come by creating a safer environment for the objects in its collections.